Amendments to the Specification:

Page 1, first full paragraph (lines 4-9), please replace as follows:

Background of the Invention

In digital radio telephones serial bit streams of data are transmitted over-the-air. The bit streams are used to modulate a carrier. There are several types of modulation schemes used to transmit data carried by the bit stream. For example, in GSM the modulation scheme used is Gaussian Minimum Shift Keying (GMSK) whereas in CDMA systems the modulation technique used is QPSK.

Page 6, last paragraph spanning over to the top of page 7, please replace as follows:

The present invention suggests that the pulse shape in a modulation scheme can be used to alter the cost functions (parameters) of the scheme. This can be ~~utilised~~ utilized in a number of ways. It allows existing modulation schemes to be looked at afresh with new pulse shapes to obtain performances that are better than those possible at present with conventional pulse shapes. By removing the strong links between particular modulations schemes and the current problems, e.g. MSK - spectral inefficiency; QPSK - power inefficiency, the modulation schemes for particular systems could be selected on a different basis,

Page 7, the last paragraph spanning over to the top of page 8, please replace as follows:

To support a faster data rate within existing channels, a channel can be divided either in time so that more than one frame is sent in a single time slot. Alternatively the channel could be divided in frequency to allow more than one frequency band to

be sent in an existing (wider) frequency band. A data user could then send data at a faster rate by using 'subchannels' within a channel allocated by the system without reducing the capacity of the system. Without the subchannels the only way the data rate could be increased would be by using more than one channel to transmit data. For every additional channel ~~utilised~~ utilized, there would be a corresponding reduction in the number of channels available, for both voice and data transmissions.

Page 9, please replace paragraphs 3-8 (lines 4-23), as follows:

Brief Description of the Drawings

Embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, of which,

~~figure~~ Figure 1 is a CDMA transmitter according to an embodiment of the present invention,

~~figure~~ Figure 2(a) is a GSM transmitter according to an embodiment of the present invention,

~~figure~~ Figure 2(b) shows the GSM frame structure,

~~figure~~ Figure 3 is an enhanced GSM transmitter according to an embodiment of the present invention,

~~figure~~ Figure 4 is a dual mode GSM/CDMA transmitter according to an embodiment of the present invention, and

~~figure~~ Figure 5 is a receiver which can be used in accordance with the present invention.

Page 10, please replace the second full paragraph (lines 13-20), as follows:

Firstly, the fixed function components in Laurent's superposition expansion are replaced by one or more functions representing respective unknown pulse components. Then cost functions: are looked at (e.g. BER, bandwidth, amplitude, AFC). That is, the errors from the values that the particular system requires are considered. The weightings of the cost functions can be varied so as to tailor the results. Values for each function are then determined, for example using an ~~optimiser~~ optimizer, which ~~minimise~~ minimize these cost functions and thus give a pulse shape which meets the specified system requirements.

Page 11, the first full paragraph (lines 8-10), please replace as follows:

Instead of using Laurent's pulses, $CK_{,n'}$, ~~we wish to use~~ an alternative pulse is used, PULSE $K_{K,n}$, which is as yet unknown, but for which ~~we wish to determine~~ an appropriate value is to be determined depending upon requisite error function requirements.

Page 13, replace the third full paragraph as follows (lines 13-15):

The interface should be ~~minimised~~ minimized. The BER performance can, for example, be improved by making the terms Pulse[0]at (N+4)T large compared to the absolute value of all the other terms.

Page 15, replace the paragraph at lines 10-11 as follows:

A pulse width of 8T has been assumed and ~~we have oversampled~~ the pulse is oversampled by 8.

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Page 17, please replace the first and second full paragraphs as follows (lines 4-10):

Now the total error function is expressed in terms of the unknowns, namely, $X_{0,i}$(i=0 to 71) and $X_{i,j}$(i=0 to 55). To determine appropriate values for the unknowns, and thus deduce the pulse shapes, this expression is ~~minimised~~ minimized using a conventional off-the-shelf ~~optimiser~~ optimizer, for example.

The implementation of a pulse function defined in dependence on desired cost parameters (~~eg~~ e.g. by the above method) will now be described.

Page 18, please replace the first full paragraph (liens 5-21) as follows:

A modulator 104 modulates these MN chips output by the Gold Code Encoder 103 on to a carrier, which is output by clock 105. The modulator 104 may be a QPSK modulator as is generally used in CDMA systems such as 1S95. However, in this preferred embodiment, the modulator is a continues phase modulator such as that used in MSK modulation. The bandwidth of the signal output by the modulator 104 is directly related to the spectrum of the pulses that are used to make up a lookup table 106. Conventionally, in CDMA, this lookup table would comprise data defining a root raised cosine. However, in this embodiment of the present invention, the lookup table defines a pulse whose shape has been ~~optimised~~ optimized on the basis of cost (error) functions, as explained above. The output of the modulator 104 is input to a digital to analogue converter 107. The analogue signal is then reconstructed by a reconstruction filter 108. A reconstruction filter might typically

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comprise a switched capacitor filter for performing some spectral shaping and an analogue filter, such as an RC filter network, for mainly dealing with residual shaping. Once the signal has been reconstructed, it is input to a power amplifier 109, which amplifies the signal for transmission by the antenna 110.

Page 18, please replace the last paragraph spanning over to the top of page 19, as follows:

Figure 2a illustrates a GSM transmitter. GSM conventionally comprises a frame structure as shown in Figure 2b. A bit sequence 201 to be transmitted is input to a frame builder ~~102~~202 of the transmitter, which puts the bits in the appropriate portion of a burst within a time slot of a TDMA frame. The bit stream is then forwarded to a modulator 204. Conventionally this modulator would be a GMSK modulator. However, in this preferred embodiment the signal is not put through a Gaussian filter. Instead, a lookup table 206 defines a pulse function whose shape has been ~~optimised~~ optimized on the base of the error functions as explained above. The lookup table will comprise 2^Tx the number of samples per second.

Page 19, please replace the first and second full paragraphs as follows (lines 6-13):

A clock ~~105~~205 provides the carrier signal as is conventional.

The modulated signal is input to a ~~digital analogue~~ digital/analog converter 207. This analogue signal is then reconstructed by reconstruction filter 208. As with the CDMA transmitter, this filter might typically comprise a switched capacitor filter for performing some of the spectral shaping and an analogue filter, such as an RO filter,

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for mainly dealing with residual shaping. Finally, the signal is amplified by a power

amplifier ~~109~~209 and is transmitted via antenna 210.

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Page 19, please replace the last paragraph spanning over to the top of

page 20, as follows:

Figure 3 shows an enhanced GSM transmitter which could be used in such a

system. This transmitter is similar to present GSM transmitters, and in this

embodiment the modulator 304 is an MSK modulator. However, this enhanced

GSM transmitter comprises 2 lookup tables 306a and 306b, which define different

pulse functions for acting on the bit sequence 301. Lockup table 306a comprises

data defining a pulse function which can act on speech with the current data rate of

9.6 kilobits per second. The data of this lookup table could correspond to the

Gaussian curve, so that it provides the same modulation (~~ie~~ i.e. GMSK) as is

currently used in GSM. However, preferably, it comprises data defining a pulse

function according to the present invention, for example one which is ~~optimised~~

optimized for a more stringent cost function.

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Page 20, please replace the second full paragraph (lines 11-16), as follows:

As mentioned previously, flexibility of choice of modulation scheme for a particular

telecommunication system has been restricted due to the modulation schemes

having certain efficiencies and inefficiencies tied to them. However, by removing

these ties by providing a suitable pulse shape which meets the cost function

requirements of a certain system, the present invention provides greater flexibility.

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Page 21, please replace the first and second full paragraphs (lines 6-17), as follows:

Figure 5 shows a typical receiver. A received signal is put through at least 1 IF stage 501 to reduce its frequency to a base band frequency and then the signal is split into its I and Q components and the carrier is removed from the signal, using mixers 502a and 502b and low pass filters 503a and 503b. The signal is then converted from an analogue signal into a digital signal by the A/D converters 504a and 504b and forwarded to the Demodulator stage 505. At this stage, demodulation, any ~~equatisation~~ equalization, and decoding etc is performed.

The present invention includes any novel feature or combination of features disclosed herein either explicitly or any ~~generalisation~~ generalization thereof irrespective of whether or not it relates to the claimed invention or mitigates any or all of the problems addressed.